

WHAT IS CLAIMED IS:

1. A switch mode power supply for supplying an output voltage and current to a load, comprising:
  - a transformer including a primary winding and a secondary winding;
  - a primary circuit comprising a switching stage electrically coupled to the primary winding of the transformer; and
  - a secondary circuit connected to the secondary winding of the transformer, wherein the secondary circuit comprises a rectifier circuit electrically coupled on an input side to the secondary winding, the rectifier circuit providing a rectified output voltage to a storage capacitor, and an output circuit including a switching device electrically connected on one side of the switching device to the rectifier circuit and on another side of the switching device to one side of an output capacitor, an output terminal and an input of a voltage sensing and control circuit, and the voltage sensing and control circuit providing an output that controls switching of the switching device such that the output voltage is regulated.
2. The power supply of claim 1, wherein the output circuit does not comprise an inductor.
3. The power supply of claim 1, wherein the switching device comprises a semiconductor field effect transistor having a source, a drain and a gate.
4. The power supply of claim 3, wherein the voltage sensing and control circuit comprises a resistor divider electrically connected across the output capacitor and having a node electrically connected to a comparator, and the comparator compares a voltage at the node to a reference voltage and is operably connected to the gate of the field effect transistor such that field effect transistor is switched on and off regulating the output voltage.

5. The power supply of claim 1, wherein the voltage sensing and control circuit comprises a resistor divider electrically connected across the output capacitor and having a node electrically connected to a comparator, and the comparator compares a voltage at the node to a reference voltage and is operably connected to the switching device, such that the switching device regulates the output voltage.
6. The power supply of claim 1, wherein the primary circuit comprises a resistor divider electrically connected across a DC blocking capacitor, the resistor divider having a node, the node being electrically connected to a comparator such that a second switching device and a third switching device are alternatingly switched on and off at a frequency determined by an oscillator.
7. The power supply of claim 6, wherein the frequency is at least 100 kHz.
8. The power supply of claim 6, wherein the capacitance of the rectifier circuit is less than 1  $\mu$ F.
9. The power supply of claim 1, wherein the rectifier circuit comprises first and second diodes coupled as a voltage doubler.
10. The power supply of claim 1, wherein the transformer comprises a planar isolation transformer.
11. The power supply of claim 10, wherein the planar isolation transformer comprises a printed circuit board transformer comprising the primary winding and the secondary winding deposited on opposite sides of a printed circuit board.

12. An output circuit for a step-down converter, the step-down converter having an output voltage across a first lead and a second lead, the output circuit comprising:

a switching device electrically connected on one side of the switching device to the first lead and on another side of the switching device to one side of a capacitor, an output terminal and an input of a voltage sensing and control circuit, wherein the voltage sensing and control circuit is operably connected to the switching device such that the switching device regulates the output voltage of the step-down converter, the voltage sensing and control circuit switching the switching device on when the output voltage drops below a reference voltage.

13. The output circuit of claim 12, wherein an inductor is not coupled in the output circuit.

14. The output circuit of claim 12, wherein the switching device comprises a semiconductor field effect transistor having a source, a drain and a gate, and the voltage sensing and control circuit is operably connected to the gate of the field effect transistor.

15. The output circuit of claim 14, wherein the output voltage sensing and control circuit comprises a hysteretic comparator and the hysteretic comparator compares a voltage related to the output voltage with a reference voltage such that the output voltage sensing and control circuit turns the field effect transistor on and off regulating the output voltage.

16. The output circuit of claim 14, wherein the semiconductor field effect transistor is a MOSFET.